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Team No. 18

Final Project Design

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Project Name

UpNext

Project Synopsis

A social media focused application allowing students to connect with university organizations and professors with the ultimate intent of promoting the stress-free organization of a student's responsibilities and deadlines.

Project Description

The goal of the project is to create a school-focused event app that allows students to be informed of events occurring at their school. A key problem that students often face is information disorganization and overload. This is particularly relevant to modern times, when many classes are entirely online, leaving students completely in charge of organizing and managing their time and tasks. Currently, students receive information about upcoming events, tasks, and deadlines through email, different websites, and word of mouth. All these sources

make it difficult to keep track of what and when tasks and events are relevant. Our app aims to centralize all those sources of information into one place, making it easier for a student to plan out his/her day as well as find partake in activities that are of interest to them. The app will allow teachers to add tasks, exams, etc. to students' schedules. Tasks will be arranged, and students will get reminders about a task based on the duration, deadline of other tasks, and schedules so that they have enough time to finish all of them. Students may also follow clubs, organizations and find events based on their time constraints and interests.
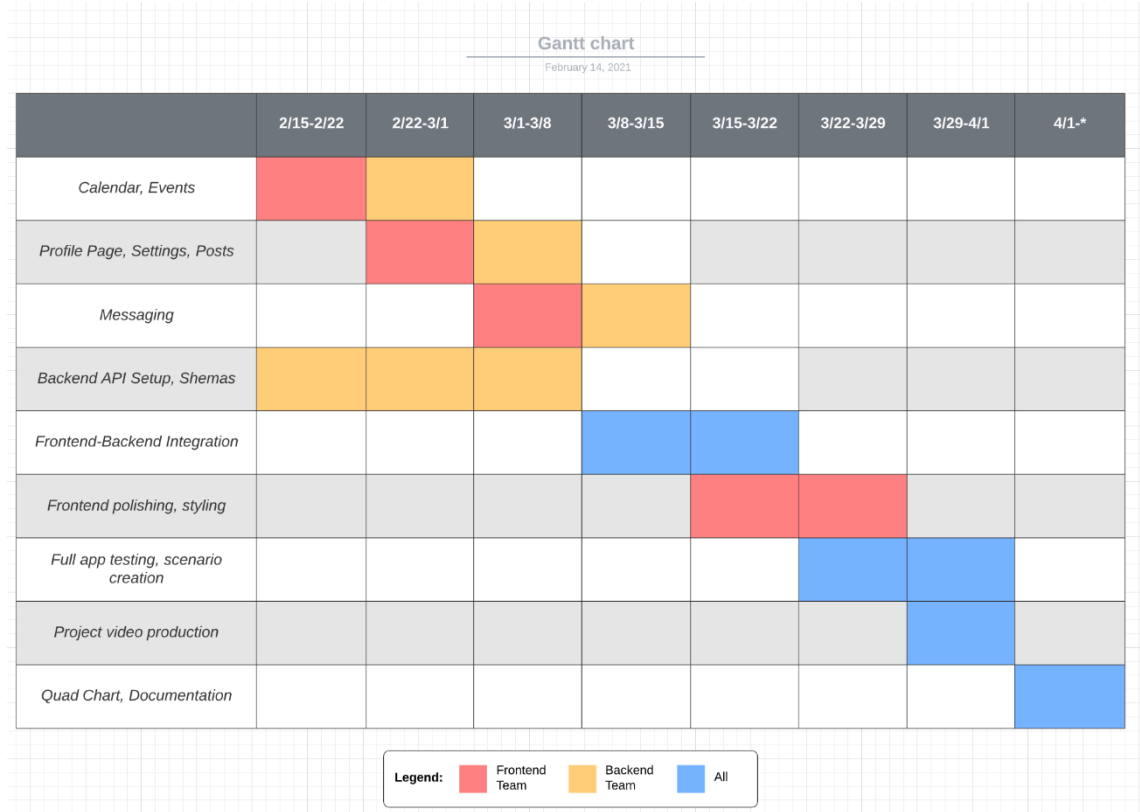
Project Milestones

First Semester:

- Project requirements/plan **(Oct. 11)**
- Project proposal video **(Nov. 13)**
- Complete React Native Udemy course **(Nov. 6)**
- Begin work on the application (backend/frontend) **(Nov. 23)**
- Documentation

Second Semester:

- Front-end implementation
- Back-end implementation, integration
- Polish/style front end
- Final testing
- Documentation
- Video production

- Quad chart

Gantt chart

February 14, 2021

	2/15-2/22	2/22-3/1	3/1-3/8	3/8-3/15	3/15-3/22	3/22-3/29	3/29-4/1	4/1-*
Calendar, Events								
Profile Page, Settings, Posts								
Messaging								
Backend API Setup, Shemas								
Frontend-Backend Integration								
Frontend polishing, styling								
Full app testing, scenario creation								
Project video production								
Quad Chart, Documentation								

Legend: Frontend Team | Backend Team | All

Project Budget

- Udemy React Native Course: $17 - required first semester
- Amazon Web Services (Serverless backend)
    - 1M free requests
    - $0.20 per 1M requests
    - $0.000001667/GB-sec

Final Project Design

Application Overview

Our application is centered around the organization, management, and exchange of school-based events. These events can come in the form of deadlines, exams, assignments, club events, study sessions, intramural sports events, and more. The goal for the application is to centralize and organize these events into one reliable, reactive, and user-friendly source for students, instructors, organizers, and administrators to view and edit a comprehensive view of all school

events that are pertinent to them, their schedule, and their interests. This app aims to create an ecosystem that minimizes the stress and organizational complexity of having to accumulate and manage events and deadlines from multiple sources.
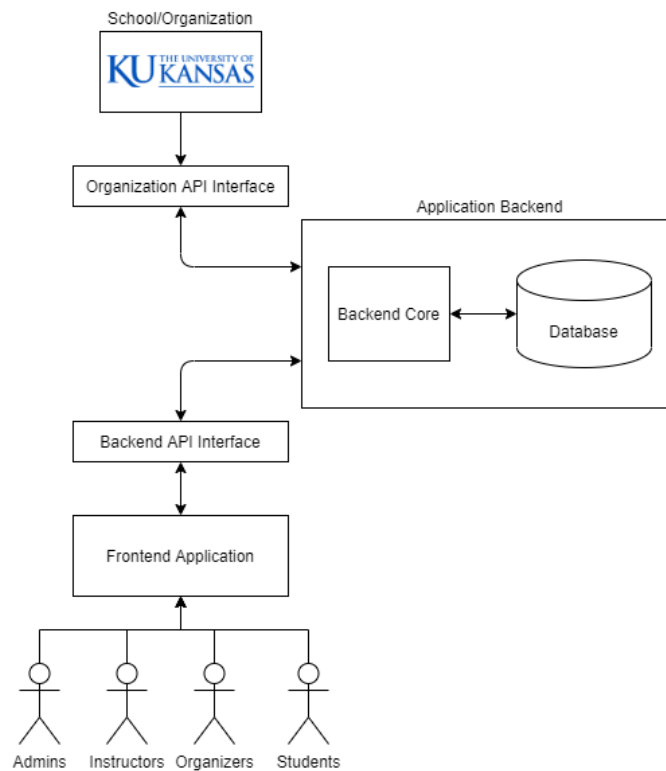
Application Users

The highest privilege user in the UpNext platform is the administrator. Administrators have read/write access to most components of the UpNext system as it pertains to their organization or school. These users have the right to change the access rights and roles of other users, flag and remove posts and messages, and approve the creation and modification of sub-organizations like clubs.

The next type of user of this application is the instructor. An instructor is the leader of one or more class groups. A user could be simultaneously an instructor and a student. An example of this would be a GTA (graduate teaching assistant). The primary application use of instructors is uploading and updating an up-to-date calendar of all relevant class events and deadlines. We shall make this as flexible as possible, allowing the import of calendars created from other calendar applications like Google Calendar or Outlook. The functionality of the application will also allow instructors to send announcements, messages, and respond to student questions.

Next, we will discuss the capabilities of the student. The student is the primary user of the app. These users may belong to multiple classes and groups. The groups may be clubs, study groups, intramural sports teams, and more. Students may easily search and find groups based on name,

tags, or interests. A key feature of the app is the accumulated calendar/planner. This feature combines all class, group, and personal events into a single calendar view. A student may edit and append to this generated calendar with personal events or events that they find through the app. Students may also message professors, organizations, and other students. Students may create study groups and, with approval, may start clubs or other types of groups.

The main way to combine people in the school's ecosystem is through the concept of groups. A group represents the composition of multiple users who are either members or leaders. Classes, clubs, and other organizations are examples of groups in the application's infrastructure. Each group has its own set of events and its own message board visible only to members of that group.
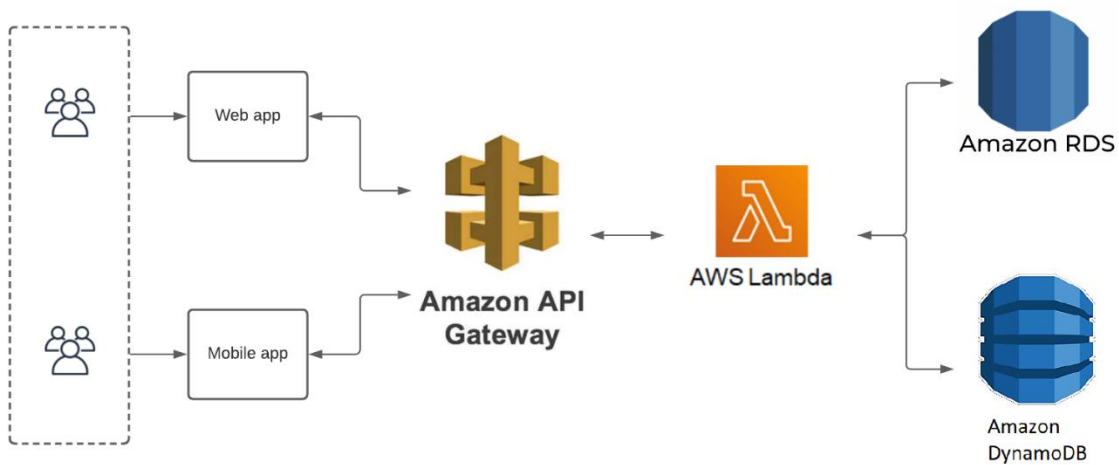
Interfaces

A major challenge in the development of this app is the way by which it shall interface with the client organization (e.g. school) IT systems. Since each client of the UpNext application has their own backend information organization system, it is required that we create an interface that each organization must implement in order for our application to query details about users and classes prevalent to the functionality of the app. By defining a common API that the client must implement, our application can query and utilize the proper information from any client system that implements the interface. This design decision shall greatly increase the potential of the NextUp platform.

Another challenge in the development of this application platform is the decoupling of the frontend user application from the backend logic. We shall define a backend API interface that allows multiple frontend implementations to interact and utilize the backend system. Once again, this design decision facilitates the separation of concerns between distinct parts of the application platform. The implementation of this backend API shall rely on the definition of the client organization interface to query and access organizational data.

Backend

The backend portion of the application is the "brains" of the application. This is where user events are handled and where application state is maintained. This implies that there shall be two main components to the backend: the event handlers and the database system. The event handler portion takes a particular event and executes the associated action, often incorporating database queries. The database portion maintains the state of application component relationships. For example, the database shall maintain the users associated with each group.
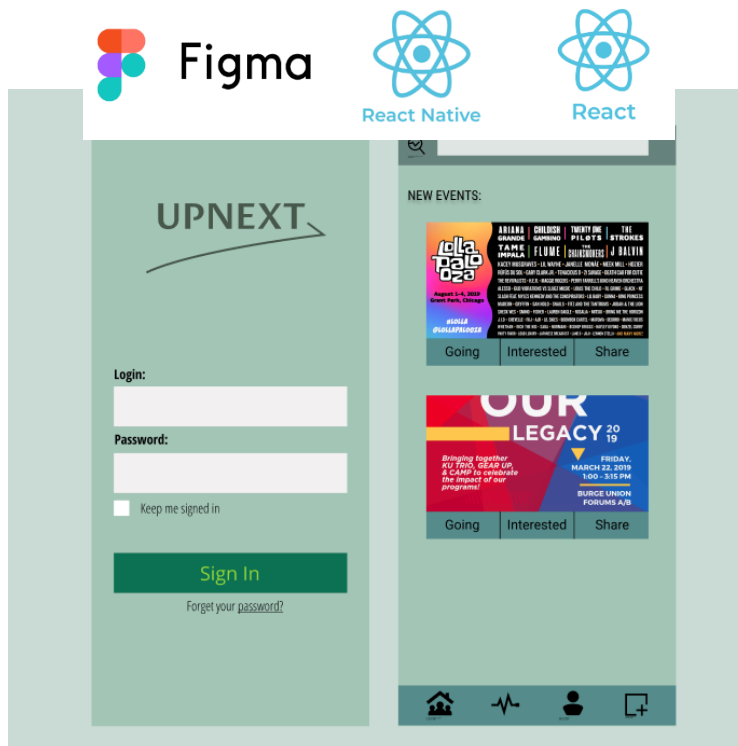
Although this backend concept may be implemented in many ways, we shall use a cloud platform for development and hosting of the backend. This shall allow us to minimize the overhead of manually setting up a shared backend environment. Using the cloud shall allow our team to more seamlessly work together, split tasks, and perform testing.

Frontend

With UpNext, we strive to create a flexible frontend solution that is available on Android, iOS, and the web. We shall use ReactJS for the web version and React Native for the mobile version. Our application user interface aims to be simple, elegant, and reactive. It is our goal to minimize the complexity and stress on the end user.

In the figure below, we show an outline of UpNext's main application components. Figma was used to design a prototype of the User Interface.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	01	02	03	04	05	06
07	08	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	01	02	03	04	05	06

Technologies

With a project of this scope, it is imperative that we choose the correct technologies to solve each of our problems. Below, we show a high-level view of the technologies that we shall use and where each technology fits in the architecture. During development, these specific technologies may change due to various constraints.

- *Amazon Web Services (AWS)*: Cloud-based backend development environment
  - *AWS Lambda*: Modular event handlers to be defined for events triggered by the application's backend API. Supports many server-side languages. Offers ease of

    Figure above: A prototype of the calendar used in the web version of the application

    development, testing, and task splitting.
  - *Amazon RDS*: Backend persistent database hosted by Amazon. Various relational database types are available including MySQL and PostgreSQL. Allows seamless integration with the rest of the backend infrastructure.
  - *Amazon DynamoDB:* Similar to Amazon RDS, except it is for NoSQL.
  - *AWS Amplify:* Simplified interface designed specifically for deploying, connecting, and interacting with AWS serverless resources from a frontend mobile or web application development or production environment.
  - *AWS Cognito:* Amazon's solution to user sign-up, sign-in, and access rights. We will utilize this to handle user management in the application.
- *ReactJS*: A JavaScript library for building frontend user interfaces on the web. We shall use this to design and implement the web implementation of our frontend.
- *React Native*: A framework for building frontend cross-platform mobile applications. We shall use this to implement the iOS and Android mobile implementations of our application.
- *Figma*: Collaborative user interface design tool. We shall use this to brainstorm and design user interfaces before implementing them in our frontend frameworks.

- *Material-UI:* A library that interfaces with React and React Native and allows for seamless definition and instantiation of common user interface components like buttons, forms, text fields, etc. with a common theme.

Ethical Issues

With an application like UpNext, **privacy and security** are at the forefront when it comes to designing features and the overall user experience.

User Information:

UpNext would be required to gather some of a student's personal information. This information includes, but is not limited to, a student's class schedule, a student's school email address, a student's personal identification number, and a student's major. While the app is in use, the user can decide if they want to let the app use their current location in order to search for events around campus that both coincide with a student's weekly class schedule, but also coincides with their general interests. UpNext users would have to trust that their personal information and school information be handled and stored appropriately within the app itself and trust the security measures in place to keep other people from accessing private information.

Third Party Event Validation:

Third party event coordinators would have to go through a background check and/or an interviewing process in order to advertise their events on our app. These are events happening outside of campus, with no academic ties to them. This includes off-campus concerts, business openings, community events, etc. This measure is in place to eliminate concerns about credibility and safety regarding certain third-party events in a user's general area. Events pertaining to a student's school, e.g. club meetings, club fundraising events, theatrical plays or shows, should be registered already through a student's school, and would not need to adhere to checks or interviews brought on by UpNext.

Intellectual Property Issues

As is the case with most software, intellectual property issues must be solved before a product can launch.

Trademarks:

Trademarks protect the use of a company's name, a product's name, its brand identity (logo), and slogans. The name "UpNext" was trademarked at some point. However, after further

research on the web, the status for the trademark UPNEXT changed to **Abandoned - Office Action Response Not Filed or Filed Late** on August 31st, 2020. This allows the name to be used without fear of legal action. UpNext does not currently have a logo or a slogan. Any logos or slogans used for the application will be created by our team. This eliminates possibility of accidentally using an already trademarked logo or slogan.

Change Log

- There were no changes made to the Initial Project Description. The ideas in the Initial Project Description were elaborated and built upon.
- Changes to the Gantt Chart were made for second semester to reflect new tasks and responsibilities. (2/14/2021)
- Added AWS Amplify, Amazon Cognito, and Material-UI technologies/packages and removed JFrog. (2/14/2021)
- Removed the cost of iOS and Android deployment fees due to the incapability of our group to maintain and deploy this caliber of application for widespread use given our lack of computing resources.